

## **Michigan Envirothon Resource Professionals Roles & Responsibilities**

Introduction: The Michigan Envirothon is an environmental education program for high school students, and is presented in a competitive format. Students form Envirothon teams of five (with up to four alternate members) and work throughout the year to study seven different environmental/natural resource subjects and to complete a Community Outreach Project. Part of the goal of the Michigan Envirothon is to give students a hands-on, outdoor learning experience and to expose them to professionals in their various fields of study. Resource Professionals that work with Envirothon students are often employees from Michigan's Conservation Districts, Michigan Department of Agriculture, USDA Natural Resources Conservation Service, and Michigan Department of Environmental Quality. Over the years there have also been Resource Professionals from Consumers Energy, University of Michigan, MSU Extension, the Shiawassee National Wildlife Refuge, Binder Park Zoo and The Watershed Center - Grand Traverse Bay.

Roles: The role of the Envirothon Resource Professional is to help provide students in the program with an educational experience like no other. Resource Professionals are encouraged to train students by providing hands-on activities while using the outdoors as a classroom (when weather permits, of course). Resource Professionals should be knowledgeable in their subject area and be able to provide students with training, resources and activities that cover the learning objectives set forth by the Michigan Envirothon (see below).

Responsibilities: There are several opportunities and different ways that Resource Professionals can work with Envirothon students:

*Regional level* - Regional training/testing days are held at four to five different locations throughout the state. In the past few years we have had Regional events in the Upper Peninsula (in Calumet and Kingsford), and in the Lower Peninsula (Traverse City, Lapeer and Battle Creek); these are one-day events held in March. Resource Professionals are responsible for conducting 45-minute training sessions to 3-4 different groups of students. Resource Professionals are also asked to submit 4 to 5 questions on their subject for use in the Regional test.

*State level* - The Michigan Envirothon State Competition is a two-day event held in May. Resource Professionals meet 1 to 2 times (usually in the fall) at the State Competition location to help choose testing sites and takes notes to aid them in developing site-specific test questions. Typically there are 4 to 5 different sites at the State Competition where teams will be tested in each subject. Resource Professionals work throughout the year to develop Envirothon test questions; the test questions should total 99 points for the subject, which typically adds up to 4 to 6 test questions per site. Suggested Guidelines & Resources for Test Writing are provided by the Michigan Envirothon office and copies of past tests are also available to help Resource Professionals. During the competition, Resource Professionals will conduct outdoor training sessions to approximately four different groups of students. They will help with setting up sites for the testing day, especially for their subject's site-specific questions, and are asked to score tests from their subject on the second day of the competition.

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There are 7 different Envirothon subject areas: Aquatic Ecology, Energy, Forestry, Soils/Geology, Sustainable Agriculture, Wildlife, and an Environmental Issue that varies from year to year. The 2007 Environmental Issue is Alternative Energy. The following is a list of the learning objectives for each subject. Resource Professionals are asked to cover these objectives in their training sessions and in their test questions.

### **Aquatic Ecology**

1. Identify the processes and phases for each part of the water cycle.
2. Describe the chemical and physical properties of water and explain their importance for freshwater and saltwater ecosystems.
3. Discuss methods of conserving water and reducing point and non-point source pollution.
4. Analyze the interaction of competing uses of water supply: hydropower, navigation, wildlife, recreation, waste assimilation, irrigation, industry and others.
5. Identify common aquatic organisms through the use of the key.
6. Delineate the watershed boundary for a small water body.
7. Be able to explain the different types of aquifers and how each type relates to water quality and quantity.
8. Briefly describe the benefits of wetlands, both their function and value.
9. Describe the changes to the aquatic ecosystem based on alteration to the aquatic habitat.
10. Know methods used to assess and manage aquatic environments and utilize water quality information assess the general water quality of a given body of water (includes sampling techniques, water quality parameters used to monitor point and non-point source pollution).
11. Be familiar with major methods and laws used to protect water quality (surface and ground water) and utilize this information to make management decisions to improve the quality of water in a given situation.

### **Energy**

1. Energy is an essential human need we obtain from our natural resources. What is energy? What are our needs for energy? Understand the different sources of energy - sun, coal, oil, gas, hydro, geothermal, nuclear - and look at how supply and demand are related to our choices of energy resources.
2. Understand that energy conservation is a consequence of our choices. Become familiar with some ways to practice energy conservation - insulation, efficient products, decisions and choices.
3. Become familiar with different energy measurement terminology and basic terms when talking about energy.
4. Learn about "alternative energy" - solar, biomass, geothermal, wind, etc.
5. Understand the different energy requirements for different types of transportation - cars, trucks, buses, airplanes, trains, boats, etc.
6. Identify and study current issues concerning energy production, uses, etc.

### **Forestry**

1. Identify common trees without a key and identify specific or unusual species of trees or shrubs through the use of a key.
2. Understand forest ecology concepts and factors affecting them, including the relationship between soil and forest types, tree communities, regeneration, competition, disturbance and succession.

3. Understand the cause/effect relationship of factors affecting tree growth and forest development (climate, insects, soils, microorganisms, etc.).
4. Understand how wildlife habitat relates to forest communities, forest species, forest age structure, snags and den trees, availability of food, and riparian zones.
5. Understand the value of trees in urban and suburban settings and factors affecting their health and survival.
6. Understand how the following issues are affected by forest health and management: biological diversity, forest fragmentation, air quality, rural development, fire and recreation.
7. Understand basic forest management concepts and tools such as: how various silvicultural practices are utilized, the use of tree measuring devices, use of technology, and best management practices.
8. Identify complex factors which influence forest management decisions (economical, social, ecological and urban interface).
9. Apply silviculture concepts and methods to develop general management recommendations for a particular situation and management goals.

### **Soils/Geology**

1. Recognize soil as an important resource.
2. Describe basic soil properties and formation factors.
3. Understand soil drainage classes and know how wetlands are defined.
4. Determine basic soil properties and limitations, such as mottling and permeability, by observing a soil pit or soil profile.
5. Identify types of soil erosion and discuss methods for reducing erosion.
6. Utilize soil information, including soil surveys, in land use planning.
7. Discuss how soil is a factor in, or impacted by, non-point source pollution.

### **Sustainable Agriculture**

1. Look at food and fiber production in Michigan and obtain an understanding of the essential human needs we obtain from our natural resources.
2. Understand the importance of agriculture in Michigan as a major land use.
3. Look at land use trends, the importance of agricultural lands to other natural components of Michigan, and look at the impact of land use policies on land use for agriculture.
4. Understand the basic glossary of agricultural terms and agricultural land use practices.
5. Look at the trend in agriculture - how we got to where we are today - small farms to industrial farming to a sustainable agriculture movement.
6. Sustainable agriculture relies upon four parts. Understand these four parts: a) agricultural product profitability, b) agricultural practices compatible with the environment, c) energy efficiency in agricultural practices, and d) a system which is supportive of rural and urban communities.
7. Understand examples of sustainable agriculture practices and methods: maintenance and improvement of soil / prevention of erosion, rotational grazing, composting, crop rotation, manure spreading, organic farming, cover crop use, integrated pest management, and value-added production.

## **Wildlife**

1. Identify common wildlife species and wildlife signs (keys will be used for more extensive identification).
2. Identify basic wildlife survival needs.
3. Describe specific adaptations of wildlife to their environment and role in the ecosystem.
4. Describe predator/prey relationships and examples.
5. Describe the potential impact of the introduction of non-native species.
6. Describe the major factors affecting threatened and endangered species and methods used to improve the populations of these species.
7. Describe ways that habitat can be improved for specific species by knowing their requirements.
8. Discuss the concepts of carrying capacity and limiting factors.
9. Discuss various ways the public and wildlife managers can help in the protection, conservation, management, and enhancement of wildlife populations.
10. Describe food chains/webs and cite examples.
11. Describe factors that limit or enhance population growth.
12. Evaluate a given habitat for its suitability for designated species, give a description of their habitat needs.

## **2007 Canon Envirothon Environmental Issue: Alternative Energy**

Decisions about the production and use of energy are critical issues of environmental, economic and social policies and of individual choice. Decisions about sources and uses of energy are made not only in the halls of national and local governments, and in corporate boardrooms, but in private homes and individual minds. The environmental, economic and social outcomes of these choices will shape the future of our nation and our planet.

Efficient use of energy generated from traditional sources and the development of renewable energy resources are two aspects of energy policy currently the focus of extensive research by state and federal government agencies, academic institutions and private companies. The fund of knowledge is great, continues to grow, and offers a wealth of resources for an Envirothon competition.

The present generation of high school students will be asked to make difficult decisions about energy both in matters of public environmental and economic policy and in matters of personal choices. Providing a structure and materials for intensive investigation into energy resources and alternatives would be a service to those students and their schools.

Sustainable, renewable energy is a crucial and intrinsic element of sustainable development. Until energy needs are met by affordable, environmentally sound means, sustainable development efforts will be greatly hampered.

Hobart and William Smith Colleges in Geneva, New York, site of the 2007 [Canon Envirothon](#), is uniquely situated to offer access to sites demonstrating a wide variety of energy resources and uses. Within less than an hour's drive from Geneva, electrical energy generation from small-scale hydropower, nuclear, and coal-fired plants may be found. Natural gas production can be observed in the area, as can greenhouses heated by methane produced from a landfill. Trinity

Hall on the HWS campus where the 2007 Steering Committee first convened is powered by a combination of solar and geothermal energy. Cornell University's unique lake-source cooling and heating installation is also within easy range and worthy of study.

Sites targeted for intensive development of wind-source generation of electricity are part of the local landscape. Two hours away from HWS are two of the largest wind farms east of the Mississippi. Proposals for off-shore wind farms in the Cape Cod area have been under study for several years. Canada is also experiencing growth of wind-energy installations.

## **2007 Canon Envirothon Environmental Issue: Learning Objectives**

### **GOAL**

Students will comprehend long term and short term environmental, **social**, and economic considerations of energy production and usage.

### **ACTIVITIES**

- Students will research, compare and contrast traditional and emerging energy production resources and applications; focusing on the environmental implications of such production.
- Students will relate energy systems to corresponding natural resources in New York State.
- Students will identify the organizations (and their roles) and the processes involved in making energy decisions in New York and globally.
- Students will describe the interactions among society, technology, and use of energy sources.
- Students will identify technologies created as a result of society's concern for dwindling non-renewable energy resources (e.g., electric cars, biodiesel).

### **OUTCOMES**

Students will be able to evaluate appropriate energy resource choices for a specific application.

## **UNDERSTANDINGS AND TOPICS OF INVESTIGATION: TASKS**

### **I. Traditional energy uses and production**

1. Identify and understand the traditional sources of energy generation of:
  - A. Electricity
    1. hydropower
    2. fossil fuel
    3. nuclear energy
  - B. Natural gas
  - C. Fossil fuels (vehicles)

2. Assess environmental impacts of the above sources in regards to:
  - A. Consumption of resources
  - B. By- products (emissions/ waste)
  - C. Impacts on ecosystems
3. Assess social and economic factors and implications:
  - A. Infrastructure
  - B. Environmental justice
  - C. Conservation practices
  - D. Organizations and agencies active in energy policy decision making
  - E. Design of energy distribution systems

## **II. Emerging energy technologies**

1. Identify and understand sources and applications of renewable energy
  - A. Solar
  - B. Wind generation
  - C. Biomass
  - D. Geothermal
  - E. Hydrogen
  - F. Ocean (Tidal) generation
  - G. Ethanol/Methanol/methane
2. Assess the environmental impacts of the above sources in regards to:
  - A. Consumption of resources
  - B. By- products (emissions/ waste)
  - C. Impacts on surrounding ecosystems
3. Assess social and economic factors and implications of the above:
  - A. Infrastructure
  - B. Environmental justice
  - C. Conservation practices
  - D. Organizations and agencies active in energy policy decision making
  - E. Design of energy distribution systems

## **III. Energy Issues Related to other Canon Envirothon Study Areas:**

1. Soils:
  - A. Identify and understand issues of traditional and innovative energy sources related to:
    1. Agricultural and forested lands
    2. Soil erosion control
2. Aquatics:
  - A. Identify and understand issues of traditional and innovative energy sources related to:
    1. Fish habitat and reproduction

2. Changes in flow rates and water levels
3. Biodiversity
4. Groundwater/aquifer resources

3. Forestry:

A. Identify and understand issues of traditional and innovative energy sources related to:

1. Biofuels
2. Species diversity – plant and animal
3. Pests and pesticides
4. Forest management practices

4. Wildlife:

A. Identify and understand issues of traditional and innovative energy sources related to:

1. Migratory bird flyways
2. Habitat loss/degradation